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INCIDENCE OF EUTYPELLA CANKER ON SUGAR MAPLE
ON THE ARGONNE EXPERIMENTAL FOREST
RHINELANDER, WISCONSIN, 1978

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INTRODUCTION

The Argonne Experimental Forest near Rhinelander, Wisconsin, consists of 6,500 acres (2,600 hectares) of timberland, one-third of which is the northern hardwood type. USDA Forest Service personnel are conducting research at the forest in hardwood regeneration. Part of this research is evaluating the effectiveness of several cutting methods on the establishment of sugar maple reproduction (Acer saccharum Marsh.) (Metzer and Tubbs 1971).

Recently, numerous cankers, possibly due to Eutypella parasitica Davidson and Lorenz, have been noticed on sugar maple reproduction in one of the shelterwood-cut areas. Shelterwood cutting looks very promising for establishing sugar maple reproduction, but concern has developed that this method of regenerating may favor infection by E. parasitica.

Eutypella cankers occur throughout the northern range of sugar maple from Minnesota to Maine (Kessler and Hadfield 1972). Infection rates generally range from 2 to 28 percent of sugar maple stems in a stand (Kliejunas and Kuntz 1974). The fungus may infect young trees through small dead branches, branch stubs, sunscald, frost cracks, or logging wounds. The perennial canker caused by this fungus is usually found in the lower 12 feet of the stem, which is the most valuable portion of mature trees. Cankers may kill trees less than 3 inches in diameter, while cankers in older trees increase the risk of wind breakage and provide entrance points for decay fungi.

OBJECTIVE

The objective of this survey was to determine whether there were significant differences in the incidence of Eutypella canker on sugar maple regenerated by different cutting methods.

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METHODS

Each 2.5 acre (1 hectare) cutting treatment was replicated three times. These replicates, plus three control blocks, were sampled at six systematically located points in each block. Each sample point served as the center of both a 0.01 acre fixed-radius plot and a variable-radius plot (BAF=10). Understory trees (<6 inches [15 cm] dbh) in the 0.01 acre plot and overstory trees (>6 inches dbh) in the variable-radius plot were recorded as exhibiting either no cankers, cankers caused by E. parasitica, or cankers of unknown origin. The aspect of all cankers caused by E. parasitica was recorded. Field diagnosis of these cankers was based on the presence of:

a. cankers of typical Eutypella shape (i.e., with cobra-like flaring bark),

b. white to buff-colored mycelial fans under the bark, and/or

c. black fruiting bodies (perithecia) with long necks protruding from bark at the center of cankers at least 6 years old.

Samples of stem cankers were collected for later isolation of the causal organism(s). In the laboratory, chips of wood and pieces of mycelial fans were transferred to potato dextrose agar and incubated in the light at 25°C.

RESULTS

For several reasons, we were unable to determine whether the incidence of Eutypella canker is related to different cutting methods. These reasons included insufficient replication of the treatments, small numbers of trees sampled in some cutting treatments, and absence of overstory trees in other treatments. However, overall incidence will be presented.

Of all the sugar maples sampled, 5.1 percent had Eutypella cankers. These cankers were observed on 7.3 percent of the understory trees and 3.1 percent of the overstory trees. Incidence of cankers by cutting treatment is summarized in Table 1.

In the understory, 65.2 percent of cankers caused by E. parasitica faced south (i.e., either southwest, south, or southeast), while 17.4 percent faced north (i.e., northwest, north, or northeast). This difference is statistically significant ($p = 0.01$) using Student's t-test. Cankers were also more numerous on the south sides of boles of overstory sugar maples, but the difference in incidence between south (54.0 percent) and north (24.3 percent) aspects was not significant ($p = 0.05$)

The presence of E. parasitica was confirmed by laboratory isolation of the fungus from several characteristic cankers.

DISCUSSION

The overall incidence of Eutypella canker of sugar maple found during this survey is comparable to that found in previous surveys (Davidson and Lorenz 1938, Kliejunas and Kuntz 1974, Miller et al. 1978). This is also true of the incidence of all cankers. Other cankers are caused by various fungi, including species of Nectria, Schizoxylon, and Fusarium.

Because some or all of the overstory trees were removed from many of the treatment blocks, it was not possible to determine whether a high incidence of cankers was due to the presence of many cankers in the overstory or to a particular cutting method. A long-term study of canker incidence from before cutting through the establishment of a susceptible understory would be necessary to evaluate the relationship between overstory and understory.

The absence of cankered trees in the understory of control blocks is probably due to the small sample (9 trees).

The significantly greater incidence of Eutypella cankers on the southern side of sugar maple saplings may be due to sunscald wounds acting as infection courts.

CONSLUSION

The incidence of Eutypella canker in the areas surveyed was low enough that adequate stands of sugar maple should develop in spite of this disease.

RECOMMENDATIONS

In areas where the incidence of Eutypella canker is low, stocking levels and spacing of trees may be more important than controlling this disease. However, if management objectives are not compromised, or if potential loss due to Eutypella canker is substantial, silvicultural controls can be used.

To reduce the incidence of this disease, cankered trees should be removed during stand treatments to reduce the number of spores available to infect susceptible trees. Fruiting bodies continue to release viable spores for at least 2 years after the cankered tree on which they are produced has been cut (Johnson and Kuntz 1976). Consequently, if cankered trees (or at least the cankered portion) cannot be removed from the stand, they should be felled and the cankers placed face down on the ground to reduce spore dissemination. In addition, trees should be protected against wounding to decrease the number of infection courts.

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Table 1.--Percentage of sugar maples with cankers, by treatment method.

Treatment	Understory			Overstory		
	No. of trees	Eutypella canker	Other cankers	No. of trees	Eutypella canker	Other cankers
		percent			percent	
Shelterwood	104	9.5	24.9	0	0	0
Crop tree	22	8.3	0	79	2.7	0.9
Selection (90 sq. ft.)	19	4.2	0.5	90	1.0	0
Selection (75 sq. ft.)	37	0	8.3	87	1.9	0
Selection (60 sq. ft.)	59	6.7	2.8	86	1.9	3.0
Clearcut (5" diameter limit)	36	4.2	17.6	102	3.9	1.9
Clearcut (1" diameter limit)	42	1.1	1.1	14	0	14.3
8" stump diameter limit	27	14.8	12.0	120	4.6	3.2
Control	9	0	0	77	5.9	2.2
Mean of all treatments		7.3	7.1		3.1	2.8